* Critical review showing holes that thesis will solve
  + Tell a story in parts: women in music, a discussion of gender, classification of gender, algorithmic bias + gendered data gap, analyses of Spotify’s black box algorithm—both in favoring men and also based on user’s identity

Women in music

* <https://assets.uscannenberg.org/docs/aii-inclusion-recording-studio-jan2023.pdf>
  + Since 2012, the USC Annenberg Inclusion Initiative has analyzed inclusion on the Billboard Hot 100 Year-End Chart.
  + From 2012 to 2022
  + In 2022, there were a total of 16- artists on the Hot 100 Year End Chart—"96.4% were male artists, 30% female artists, and 0.6% were gender non-binary” (4)
    - “This is an over time gain of 7.3 percentage points from 2012 to 2022”
    - All 3 credits filled by non-binary artists belong to Sam Smith
    - “women were most likely to work in Pop and least likely in Hip-Hop” (5)
    - Women were most likely to work in Pop, with 33% of songs by women, followed by Dance/Electronic with 21.2%, R&B/Soul with 20%, Country at 17.3%, then Alternative and Hip-Hop.
  + In 2022, women made up 25% of the duos represented on the Year-End chart, and only 4.3% of bands represented had a female-identifying member. The average percentage of bands on the Year-End charts with a women from 2012 to 2022 is 6.9% with none appearing in 2018 (6)
  + Songwriters
    - “Of the 451 songwriters in 2022, …14% (n = 63) were women. There were 3 gender non-binary songwriters in 2022” (12)
    - “For women, there has been no significant change in the percentage of songwriters across the Billboard Hot 100 Year-End Charts since 2012”
    - “Women were most likely to write Pop and Dance/Electronic songs, and least likely to write Hip-Hop/Rap and Country songs” (13)
  + Producers
    - “In 2022, a total of 231 producers were credited on the Hot 100 Year-End Chart. Of those, 3.4% were women and 96.1% were men. One producer was gender non-binary (Sam Smith)” (16)
  + The report also analyzes Grammy nominations by gender which support their findings that women are underrepresented throughout the music industry: “Overall, women represented 14% of nominees across major Grammy categories over the past 11 years” (19).
* <https://annenberg.usc.edu/news/research/women-music-climbing-charts-equality-slow-process>
* Choi, G. Y. (2016). “Who Run the Music? Girls!” Examining the Construction of Female Digital Musicians’ Online Presence. Popular Music and Society, 40(4), 474–487. <https://doi.org/10.1080/03007766.2016.1174419>
  1. individual interviews of 17 female digital musicians who create content online (YouTube, Soundcloud, and Vine)
  2. female digital musicians: self-taught musicians who mostly perform their music online and are not affiliated with record labels
  3. participatory culture: one with low barrier to artistic expression and support of creation and sharing
  4. problematic representations of female musicians
     1. difference in portrayal of men and women in the music industry
     2. sexualized body parts
  5. significance of social media in creating musicians’ online presence
  6. examples of artists to come out of all three platforms such as Lorde
  7. understand motivations behind their wok and social media uses

This research examines motivation and meaning through individual interviews with 17 female digital musicians who create content on social media platforms. Female digital musicians are understood as self-taught musicians who mostly perform their music online and are not signed with a record label. While Spotify is not directly referenced or studied, Spotify is another place of participatory culture where independent artists can promote their work without a record label. These interviews reveal struggles of gender inequity in the music industry as well as the effects of harmful comments but ultimately stress the benefits of social media that allow women to express themselves and learn new skills.

* Nappo, F., Letterese, E. M., Fusco, M., & Schimperna, F. (2019). The Impact of Gender Capital in the Music Industry. Academic Conferences International Limited.
  1. Understand the impact of gender discrimination in the music industry
  2. Artist remuneration: money paid for work or service (song)
  3. Specific to Italian music
  4. Data collected on Spotify, webpages, reports, journal articles, papers, and more
  5. Exploratory
  6. 618 Italian singers
  7. Descriptive and quantitative analysis to explore this sector
     1. Spotify listeners
     2. The average listeners for male singers was always higher than that of female singers
     3. Also analyzed age, geographical origin, famous partner, debut year, band member, follower, and like number in relation to listeners on Spotify
     4. The strongest correlations are geographical origin, followers, and likes
  8. Use Spotify artist remuneration to apply to broader study of music industry and profits
  9. Found that the impact of gender discrimination in the music industry does not exist because there was no statistically significant correlation between number of listeners and gender

Italian researchers performed a descriptive and quantitative analysis of gender discrimination in the music industry through data collected on Spotify, webpages, journal articles, and more. They used the number of listeners on Spotify as an indication of artist remuneration to analyze economic effects of potential bias. They identified about six hundred Italian singers with music on Spotify and analyzed the number of listeners an artist has as explained by age, geographical origin, presence of famous partner, followers, likes, and gender. They concluded there is no gender discrimination among Italian singers in the music industry because there was no statistically significant correlation between number of listeners and gender, though there is between number of listeners and followers.

Discussion of gender

* Landström, C. (2007). Queering Feminist Technology Studies. Feminist Theory, 8(1), 7–26. <https://doi.org/10.1177/1464700107074193>
  + Heteronormativity influences feministic research on gender and technology
  + Empirical research that often relapses into old patterns of binary femininity and masculinity despite accepting its end
  + Feminist constructivist technology studies: research focused on the production of gender and technology which relies of ethnographic methods to analyze gender in relation to the construction and use of technology
    - Black boxing gender identity which classifies it stably with malleable technology
    - Reproduction of heteronormativity
  + Critique of feminist constructivist technology studies
    - Ultimately arguing for a shift in theoretical framework
    - Technology is shaped in complex social and cultural processes and technology cannot be socially neutral so gender must be an integra part of social shaping of technology
    - Since technology and society are so similar and influence each other, they coproduce gender
    - Gender shaped by technology
    - Research has confirmed that technology s dominated by men and associated with masculinity
    - many technologies use the programmer or creator as the model user
    - creator’s gender identity produces effects
  + critiques
    - treat gender as stable trait
    - double constructivist analysis should account for the gender of engineers also being constructed as technology is constructed
    - heteronormativity—possibility for women to express themselves outside of gendered expectations
      * underlying assumption
  + cyborg
    - hybrid of machine and organism that confuses all modes of identity categorization
  + assemblage
  + queer theory to critique power relations
    - understanding and studies of identity should be expanded
    - expands understanding of gender from the binary and also allows for more individual experience

Landstrom, a researcher at Goteborg University, provides a critique of feminist constructivist technology studies in favor of queer theory and more expansive understanding and study of gender. Feminist constructivist technology studies are studies which analyze the coproduction of gender and technology often using empirical research which relapses into old patterns and understandings of the gender binary. Landstrom argues treating gender as a stable trait does not consider gender fluidity or the way technology creation can also construct and influence gender. Consideration and analysis beyond the gender binary allows for expansion and understanding of individual experiences outside of heteronormative understandings and experiences.

Classification of gender and methods

* Hu, Y., Hu, C., Tran, T., Kasturi, T., Joseph, E., & Gillingham, M. (2021). What’s in a name? – gender classification of names with character based machine learning models. Data Mining and Knowledge Discovery, 35(4), 1537–1563. <https://doi.org/10.1007/s10618-021-00748-6>
  + Verizon, Yahoo, and Worcester Polytechnic Institute
  + Gender no longer being a required field for creating accounts means many users do not have assigned genders, though gender is still a helpful factor for recommendations
  + Treats gender classification as binary to determine gender by username
  + Character-based machine learning approaches for gender classification
  + SSA (Social Security Administration) baby names which includes gender
  + Verizon media dataset of 100 millino + Yahoo and AOL users
  + Two approaches
    - Use name embeddings as features
    - Character-based approaches are found to be more accuruate
  + Problems of inferring gender from users’ first names
    - Different gender connotations in different cultures

Researchers at Yahoo, Verizon, and Worcester Polytechnic Institute analyze the prediction accuracy of statistical learning models to classify gender given usernames. Gender is worthwhile to predict since it is no longer required in account creation but can be a helpful factor in recommendations. The researchers treated gender as a binary, though admit it is not so, and trained models on name data from the Social Security Administration and Verizon dataset of Yahoo and AOL names. Ultimately, they found a character-based logistic regression approach was most accurate for gender classification, though there are problems with all gender classification models.

Algorithmic bias

* Bishop, S. (2018). Anxiety, panic and self-optimization: Inequalities and the YouTube algorithm. Convergence: The International Journal of Research into New Media Technologies, 24(1), 69–84. <https://doi.org/10.1177/1354856517736978>

A case study to YouTube’s recommendation algorithm through beauty vloggers.

* How algorithmic recommendations can favor specific content
* Polarization on the basis of gender
* The researcher argues that YouTube systematically promotes feminized material and videos
  + By rewarding and promoting feminized content
* Argues that content creators learn and embody the algorithmic process
  + Make assumptions that influence the way they present themselves
* political economy approach admitting YouTube is owned by Google and they are both profit-oriented technology companies.
* Specific to YouTube
* Algorithms which learn and tune themselves have unintended side effects of amplifying existing societal problems like discrimination and gender bias
* Proves this through examples
* Distinction between what the algorithm is doing and what the content creators believe it is doing
* YouTube algorithm is a black box
* Concept of reverse engineering the algorithm by examining what output is produced based on what input is fed
* Methodological issues
  + Algorithm changes often
* Online ethnographic approach

This case study into YouTube’s recommendation algorithm through beauty vloggers argues that YouTube is part of a political economy which perpetuates gender bias and outdated gender norms for success and profit. Bishop distinguishes between what a recommendation algorithm does and what content creators believe it does and engages in an online ethnographic study to compare the two. The goal is to reverse engineer the YouTube recommendation algorithm by analyzing its three main components, though there are methodological issues with this approach. Ultimately, through examples and the case study, Bishop suggests that YouTube, like many other machine learning algorithms, can learn to perpetuate societal inequalities unintentionally or rather due to lack of consideration.

* French, M. R. (2018). Algorithmic mirrors: An examination of how personalized recommendations can shape self-perceptions and reinforce gender stereotypes (Order No. 28115243). Available from ProQuest Dissertations & Theses A&I. (2436884514). Retrieved from <https://login.ezproxy.uvm.edu/login?url=https://www.proquest.com/dissertations-theses/algorithmic-mirrors-examination-how-personalized/docview/2436884514/se-2>
  + Researchers at Stanford investigate the extent to which algorithmic bias can affect self-perception. Their experiment involved assigning women to two groups—one which received personalized stereotypically “feminine” career recommendations and another which received personalized stereotypically “masculine” recommendations which they were told were based on their Facebook activity. Participants who received feminine career recommendations reported lower masculinity, leadership ability, and self-confidence. Participants who received masculine career recommendations and believed the recommendations were based on internal characteristic reported higher estimates of leadership ability than those who received the same recommendations but did not believe they were based on an internal locus, however all overall greater than participants who receive “feminine” recommendations. This study demonstrates how one’s understanding of the system can moderate its effects on one’s sense of self and emphasizes the far-reaching implications of algorithmic bias.
* Leavy, Susan (2018). Gender bias in artificial intelligence: the need for diversity and gender theory in machine learning. In Proceedings of the 1st International Workshop on Gender Equality in Software Engineering (GE '18). Association for Computing Machinery, New York, NY, USA, 14–16. <https://doi.org/10.1145/3195570.3195580>
  + The author investigates the impact of the overrepresentation of men in the design of technologies on gender equality. The author claims humans have developed the ability to think critically and make decisions informed by more than personal experience, however machine learning could undo gender equality advances by making decisions based on the training data. If the data itself is bias, the resulting algorithm will work to perpetuate the implicit bias. Data is often implicitly bias and even efforts to remove bias are not entirely successful as gender ideology is embedded in so many other fields and parts of life, such as language itself. The author suggests that those are affected by the bias are most likely to address and attempt to solve it, and it must be solved to prevent the continuation of gender bias and inequality.
* Thelwall, M. (2018). Gender bias in machine learning for sentiment analysis. Online Information Review, 42(3), 343–354. <https://doi.org/10.1108/oir-05-2017-0153>
  + Researcher at University of Wolverhampton
  + Does machine learning induce gender bias by providing more accurate results for male authors than female authors and does training separate variants improve accuracy
  + Automatic sentiment analysis algorithms: algorithms used in market and customer relations research to detect opinions of customers from online posts in real-time
    - Could it be more likely to detect sentiment from one gender than another? Overrepresenting the sentiment of one gender?
  + Addresses the way machine learning can learn society’s gender prejudices since they learn from word associations and perpetuate them by including what they have learned into the model
  + As well as growing concern that data processing algorithms and machine learning are introducing and perpetuating bias
  + Trains algorithms on ratings-balanced sets of reviews of restaurants and hotels from TripAdvisor.com with and without gender selection
    - Gender classification performed using first name or first part of username being 90% male or female in the 1990 US Census and discarded those who did not fall into either category
    - Verified by manual checking but rejected about 70% of the data
  + Female-authored classified more accurately than male-authored reviews in all data sets
  + Rating estimates for male-authored reviews are more accurate from model trained exclusively on male-authored reviews as input, similar for female-authored reviews
  + and as such female-authored reviews are overrepresented in models not separated for gender
  + Training on the same gender improves performance, though not as much as training with both genders

Automatic sentiment analysis algorithms are defined as algorithms used in market and customer relations research to detect customer opinion from online posts in real time and have many practical implications from sales to politics.

Researchers at University of Wolverhampton analyzed thousands of TripAdvisor reviews of hotels and restaurants in the UK reviewed by UK residents to analyze gender bias in machine learning for sentiment analysis. It began by defining automatic sentiment analysis algorithms and addressing the way machine learning can perpetuate society’s gender prejudices. The study trained algorithms on ratings-based reviews from TripAdvisor with and without gender selection and classified the gender of the author through another machine learning algorithm based on the first name or beginning of the username for an author. This method classified an author as male or female if their name or username was 90% male or female in US census data from 1990 but discarded about 70% of the data that did not fit this model. Ultimately, the researcher found that rating estimates trained on input reviews of one gender were more accurate for that gender and stressed that those interpreting sentiment analysis results should consider gender bias.

Gendered data gap

* Invisible Women book
  + “voice recognition software in cars is often hopelessly male-biased…70% more likely to accurately recognize male speech than female speech” (162)
  + Because “speech-recognition technology is trained on large databases of voice recordings, called corpora. And these corpora are dominated by recordings of male voices” (164)
  + “Text corpora (made up of a wide variety of texts from novels, to newspaper articles, to legal textbooks) are used to train translation software, CV-scanning software, and web search algorithms. And they are riddled with gendered data gaps” (164)
  + “Algorithms trained on these gap-ridden corpora are being left with the impression that the world actually is dominated by men” (164)
  + “machines aren’t just reflection our biases. Sometimes they are amplifying them—and by a significant amount
* Rena, B., & Haimson, O. L. (2016). Baking Gender Into Social Media Design: How Platforms Shape Categories for Users and Advertisers. Social Media + Society, 2(4) <https://doi.org/10.1177/2056305116672486>
  + social media platforms have stopped requiring gender or allowed freeform fields
  + explores how gender is baked into social media design by investigating the user and advertiser experience on 10 of the most popular English speaking social media platforms
  + how is meaning given to gender in these spaces
  + social media as larger ecosystem of advertising and web analytics given control over generation of broader categorization systems which can be wielded to shape needs
  + design decisions where and how to include gender bake in assumptions
  + recursively define gender
  + social media as programmed spaces for digital identity construction
  + sorting and classifying gender boost monetization strategies
  + dissonance between platform’s use of gender options and user’s intention
  + immersive, ethnographic walk through study
    - new user registering an account
      * mandatory gateways for data collection
        + mandatory binary gender fields reify a gender categorization schema that erases those outside the binary
      * transitory spaces
      * increasingly immune to change over time
    - a new advertiser creating an ad

Researchers engage in an immersive, ethnographic study also described as a walkthrough of 10 of the most popular English-speaking social media sites to understand the way gender is embedded in social media by design. By analyzing the process for new users registering for an account and new advertisers creating an ad, the researchers found many sites are moving away from the gender binary for users, however still using this demographic information heavily for advertising. The social implications of gender in social media cannot be understated as social media and technology become part of our societies and are designed for identity curation and performance. Moving away from gender binary choices for users is a good step but not enough to support meaningful social change away from the gender binary without a change in understanding from the advertising perspective as well.

Spotify in general

* Haupt, J. (2012). Review: Spotify. Digital Media Reviews , 69(1), 132–138. <https://doi.org/10.1353/not.2012.0115>
* Leisewitz, A., & Musgrave, G. (2022). Does Spotify create attachment? Culture Unbound, 14(1), 75–100. <https://doi.org/10.3384/cu.3384>
  + Do algorithmically generated playlists create attachment between consumers and producers of the music?
  + Answers debate in professional music press about the ability of streaming platforms to create relationships between the artist and listener and sustainable income for musicians
    - Relationship between the streaming platform and the listener through algorithmic curation of music
    - Music may be consumed more but the consumption is less meaningful
    - Professional musicians are struggling and fear their songs are not given proper context or engaging listeners in meaningful ways
  + Conceptualize streaming platforms as cultural intermediaries or a connection between the masses and more legitimate culture, influencing taste and giving legitimacy to specific cultural goods
    - Spotify acts as a cultural intermediary by giving value to specific songs the algorithm deems worthy and promoting them as legitimate to listeners
  + Attachment as willingness to engage in and maintain a relationship with consideration for emotional connections which influences the success of musicians and their songs
    - Studied in two different kinds of music consumers—those who are heavily involved and those who show less interest
    - Interest to reflect the difference in Spotify users and the nature of the algorithm to become more refined the more a user listens
    - Pre-survey about attachment
    - Questions after listening to the Discover Weekly for a week about attachment and calculated scores
    - However they used a very small sample size of originally 9 individuals only 2 of which had high musical involvement
  + 115 question survey completed by listeners to Spotify’s ‘Discover Weekly’ Playlist for a one-week period
  + Playlists generated almost no attachment for those who were poorly-involved new music consumers and only mid-levels for those considered heavily-involved new music consumers
  + These algorithmics influence low-cost audience attachment behaviors and ultimately limit the economic success of an artist

The authors sought to understand whether Spotify algorithms can create attachments between the artist and their fans to add to the growing debate about online streaming and its ability to generate substantial income and success for musicians. The authors began by defining Spotify as a cultural intermediary as it algorithmically gives value to specific songs promoted to listeners and defining attachment as a willingness to engage in and maintain a relationship with consideration of emotional connection to an artist or song. Musical involvement was determined in an initial survey, and attachment was analyzed in a survey after a week-long listening period. They found Spotify’s “Discover Weekly” algorithm generated very little attachment for listeners who were not previously musically engaged and relatively mid-to-low attachment for those who were highly engaged. It is important to note, however, that the sample size included only nine students at the same university, only two of which were categorized as highly musically engaged.

Spotify and gendered data

* Anderson, A., Maystre, L., Anderson, I., Mehrotra, R., & Lalmas, M. (2020). Algorithmic Effects on the Diversity of Consumption on Spotify. Proceedings of the Web Conference 2020. <https://doi.org/10.1145/3366423.3380281>
  + The authors, Spotify employees and researchers at University of Toronto, detail their randomized experiment on algorithmic recommendations’ impact on diversity and retention. Diversity is defined by the coherence of the set of songs a user streams. By embedding millions of songs based on listening behavior, the researchers were able to quantify a user’s musical diversity and analyze the effectiveness of algorithmic recommendations by diversity score. Algorithmic recommendations appear to be more effective for users with lower diversity and are associated with reduced consumption diversity. Diversity of consumption retains users for the long-term, however short-term enjoyment is also required for user retention, exposing a nuanced tension between diversity and retention over time.
* Eriksson, M. C., & Johansson, A. (2017). Tracking gendered streams. Culture Unbound, 9(2), 163–183. <https://doi.org/10.3384/cu.2000.1525.1792163>
  + Bot experiments
  + Does Spotify assign different taste profiles to male and female users
  + If and how gendered patterns in music recommendations exist on Spotify
  + Male artists highly overrepresented which prompts users to cite hegemonic masculine norms within the music industries
  + Algorithms constitute new form of power and are closely related to capitalism
  + Serve as cultural intermediaries
  + Technology is social and political
  + Gender performativity of how gender is expressed and performed that is exercised through humans, human networks, and technology (Butler)
  + Masculinity and femininity tied to musical genres and marginalization of women in the music industry
  + Explore similarities and differences in music recommended to Spotify users registered as male and female
  + Bots that were coded to behave like users to engage with Spotify’s software
  + 288 users in four groups (rock, gospel, rnb/hiphop, dance/electronic) where bots listened to the 10 most popular songs on Billboard’s top 100 hit list within their genre
  + The majority of bot users where given the same recommended artists regardless of gender with the least gender disparity in rock and gospel.
  + Commonly gender skewed recommendations in rock genre and to a lesser degree rnb and dance but not in gospel
  + Categorized gender of recommended artist through text mining for pronouns, names, and photographs
    - None found outside gender binary and designated groups of more than one gender as “mixed”
  + Using popular music should also be warry that popular music is a gendered phenomenon

Researchers at Linkoping University performed 288 bot experiments within four genres—rock, gospel, rnb/hip-hop, and dance-electronic. They began by discussing the gender binary, gender performativity, and the marginalization of women in music, especially popular music. They had these 288 bots register as Spotify users being either male or female and listen only to the top 10 songs out of the top 100 songs on the Spotify chart of their given genre. Their results found that the majority of bot users where given the same recommended artists regardless of their account’s gender, though there were gender-skewed recommendations mostly in rock, though also present in rnb/hip-hop and dance/electronic. They used text mining of artists’ information for pronouns as well as names and photographs for gender classification.

* Holtz, D., Carterette, B., Chandar, P., Nazari, Z., Cramer, H., & Aral, S. (2020). The Engagement-Diversity Connection: Evidence from a Field Experiment on Spotify. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.3555927>
  + This field experiment in Spotify aimed at understanding recommendation type’s effect on consumption in the context of podcasts on Spotify. Members of the treatment group had recommendations personalized based on their listening history while members of the control group had recommendations based on popular podcasts among users in their demographic group. They found that personalized recommendations increased podcast streams and overall average diversity of podcast streams but decreased the average individual-level diversity. Their findings demonstrate the engagement-diversity trade-off where recommendations drive immediate consumption but long-term diversity is positively correlated with long-term retention.
* Werner, A. (2020). Organizing music, organizing gender: algorithmic culture and Spotify recommendations. Popular Communication, 18:1, 78-90. [https://doi.org/[10.1080/15405702.2020.1715980](https://doi.org/10.1080/15405702.2020.1715980)](https://doi.org/10.1108/oir-05-2017-0153)
  + The author analyzes how three different areas of Spotify’s recommendation algorithms—Related Artists, Discover, and Browse—present gender while also presenting music. The listening experience of 80 young adults from Moscow and Stockholm were analyzed as well as the visual user interface with screenshots of the platform. Related Artists pages were found to often have artists of the same gender and demographic group as the original artist. Discover seemed to be less demographically cohesive as it consists of personalized recommendations and responds to recent listening behavior; however it still recommends music similar in genre, gender, and race (though not to the same extent as Related Artists). Lastly, the Browse algorithms were more diversified than the previous as they are designed to serve a larger national community of users. There is also a discussion of feminist theory ideas about the masculinization of specific genres and how they may be at work in concurrence and separately from algorithmic bias.

Sources to Add:

* Feminist theory about the social construction of gender
* Gender studies and non binary gender identities
* Recommendation algorithms and the importance of representation
* Importance of diverse artists in music
* Spotify black box algorithm reverse engineering

# Spotify

Spotify algorithms have been analyzed in a variety of ways in the past, though little is known about the gender discrepancy in their output. It is suggested that Spotify uses content-based and collaborative filtering to generate track representations. Content-based filtering meaning the content of each track, such as artist name, songwriting credits, and genre, but also includes metrics Spotify calculates based on these attributes such as danceability as well as a semantic meaning estimated with natural language processing models. Collaborative filtering describes the track’s connection to other tracks and what other users with similar tastes are listening to. Each user on Spotify also has their own “taste profile” or Spotify’s understanding of what the user likes based on their listening history. While Spotify reveals a lot to users and artists about how its algorithms work, it is currently unknown whether artist gender is meaningfully included in the content-based filtering, and it is also unknown whether there is a data gap in music from female-identifying musicians based on the near infinite amount of content on Spotify. As such, it is difficult to know if there is gender bias in Spotify’s recommendation algorithms and where it is coming from.

A study of Spotify’s visual user interface as well as recommended songs attempted to understand how Spotify recommendation algorithms present gender when presenting music. They analyze the listening experiences of 80 young adults in Moscow and Stockholm using three common Spotify recommendations—Related Artists, Discover Weekly, and Browse. Related Artist recommendations are artists recommended based on a current artist the user is viewing. These recommendations were found to often have artists of the same gender and demographic group as the original. The Discover playlist is a playlist of 30 songs generated weekly for each user individually and was less demographically cohesive, though still recommended music similar in genre, gender, and race. Browse algorithms are general playlists available for large communities of users and were the most diverse. The study confirms that the Discover playlist is mostly unique to each user but did not address what other factors might determine the recommendations made there.

Researchers at Linkoping University attempted to understand user’s gender’s impact on Spotify’s “black box” algorithm. They performed 288 bot experiments within four genres—rock, gospel, rnb/hip-hop, and dance-electronic—with each bot registering as a male or female user and listening to only the top 10 songs out of the top 100 songs of their given genre. The majority of bot users were given the same recommended artists regardless of their account’s gender, though gender-skewed recommendations were found in rock as well as rnb/hip-hop and dance/electronic (Friksson). This experiment concludes that account gender is not a heavily weighted factor in Spotify’s recommendation algorithm but does not further analyze these “gender-skewed” recommendations by category.